GIMSON ROBOTICS

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GR-WM4-ENC – Product Reference Sheet

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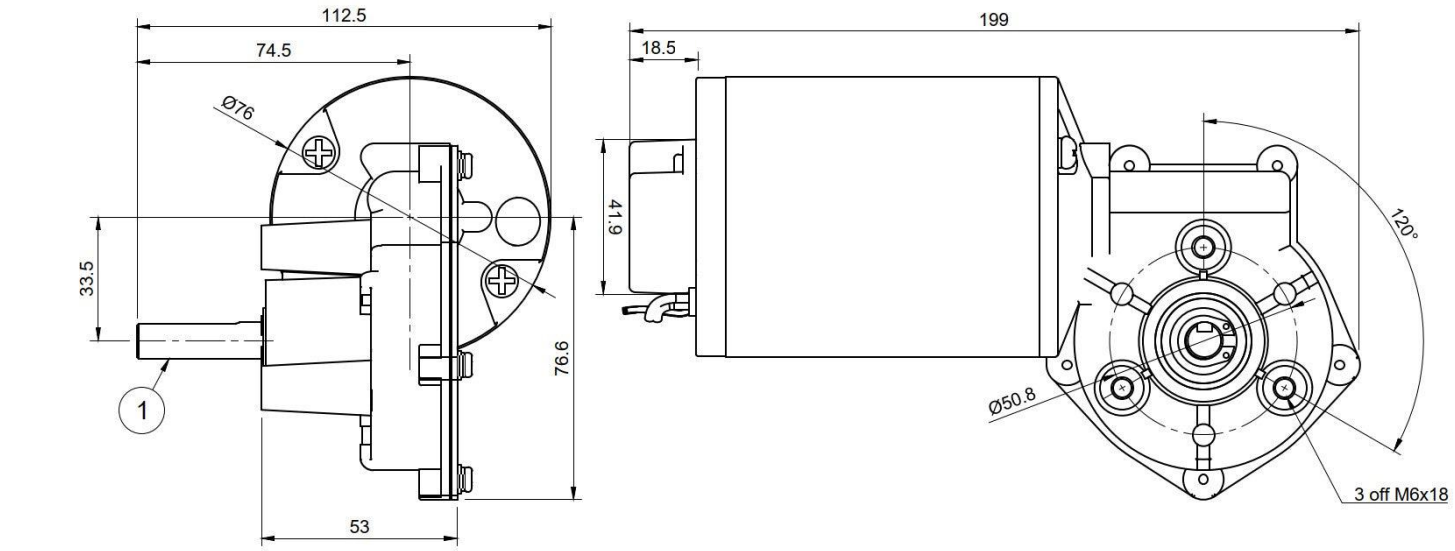
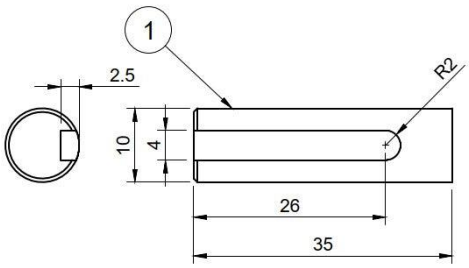
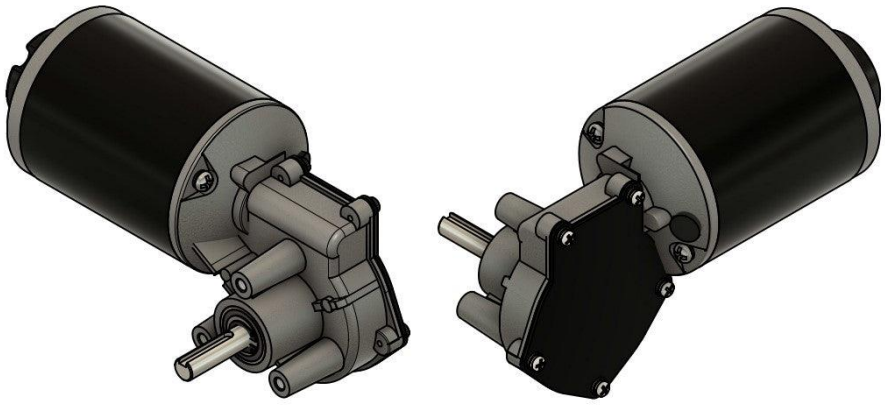
Gimson Robotics Item Reference	GR-WM4-ENC
Motor	24V DC standard, brushed permanent magnet
Maximum Load	91.8kg-cm continuous (within duty cycle limit), up-to 222kg-cm static torque load
Current for Rated Load	4.2A
No-load Speed	37rpm (at nominal voltage)
Rated Load Speed	28rpm
Maximum Duty	40%, up-to 2 minutes continuous. For example, for every 2 minutes of operation, 3 minutes rest.
Current for Maximum Load	9A (overcurrent protection must be used to prevent damage to the gearbox)
Transmission	1-Stage 40Cr steel worm gear with 60 tooth bronze worm-wheel (60:1 ratio)
Weight	1810g (with standard lead option)
Shaft	10mm diameter (h7) by 35mm long. Features a 26mm long, 4mm wide and 2.5mm deep rectangular keyway
Shaft Support	Dual deep-groove 6000RS (10mm ID) ball bearings
Radial Load Rating	Up-to 82kg-cm (8Nm) maximum. Equivalent to approximately 23kg across the end of the shaft
Mounting	3off M6 tapped holes, 18mm depth. Approx. 50.8mm PCD, see drawing on page 2
Colour	Black painted motor can, plain grey cast aluminium gearbox body (no options available)
Enclosure Rating	Untested (IPXX), the motor is NOT designed for exposed outdoor use
Operating Temperature (Ta)	-5°C ~ 45°C
Insulation Class	F (Maximum hot spot temperature for windings 155°C)
Cables	Motor wires (2off Red & Black): UL-1015-AWG18 Encoder wires (4off Red, Black, Yellow, Blue): UL-1007-AWG-26
Electrical Design	The motor features a 10nF capacitor between each motor brush and the body, a 5.8uH inductor in series with each motor brush, and ferrite choke on the motor wires as they exit the body, all intended to reduce the level of electrical noise emitted by the motor
Encoder	Quadrature encoder (dual hall sensors) mounted to rear of motor with black plastic case, designed to operate from 5V DC supply (to smaller red and black wires). 12 pulses per motor revolution (across both encoder channels), equivalent to 720 pulses per output shaft rotation.
Product Standards	EN 61000-6-3: 2021 RoHS Directive 2015/863 (RoHS 3) EN 61000-6-1: 2019 *Be aware that EMC performance is dependent upon connected hardware*

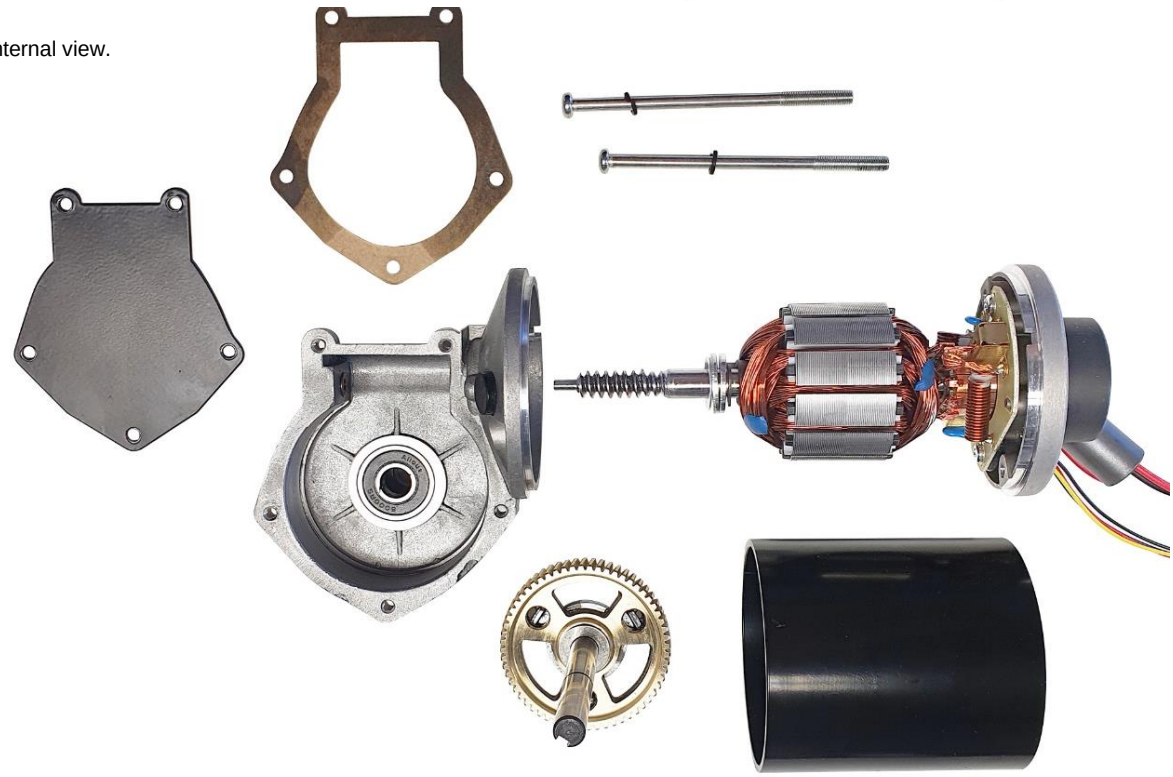
Motor drawing. Allow for +/- 0.5mm on major dimensions.







Motor internal view.



Operating characteristics (values at output from gearbox)

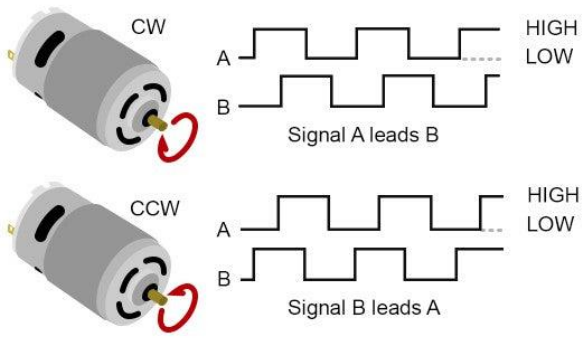
	at 24V DC	at 12V DC
No-load speed	37rpm	18rpm
No-load current	0.85A	0.75A
Continuous rated torque, speed (**maximum 40% duty, up-to 2-minutes continuous**)	91.8kg-cm, 28rpm	45.9kg-cm, 14rpm
Rated load current	4.2A	2.5A
Rated output power	26W	6.6W
Max. power torque, speed	204kg-cm, 18rpm	102kg-cm, 9rpm
Max. power current	8.4A	4.4A
Stall torque	(408kg-cm)	204kg-cm
Stall current	(16A)	8A
Current for maximum rated gearbox load	**9A**	-

The maximum rated output torque of the gearbox is 222kg-cm (limited by gearbox bearings). Ensure that the supplied current is limited to below the value highlighted in red to the left, to prevent the motor from damaging itself by exceeding this maximum load.

Please be aware that some of the values above are extrapolated from other measurements and it's normal for there to be some variance from motor to motor, you should allow for a safety factor of *at least* 10% above/below the given values when designing for your application. Be sure that any equipment that you use with the motor (power source and controller) is capable of handling the currents that the motor may demand, whilst also being able to limit the current to protect the motor in the event of the load increasing unexpectedly.

Integrated Encoder

The motor has a hall-sensor based quadrature encoder mounted to its rear, inside the black plastic rear cover. The encoder is not required for operation (and won't affect operation if left disconnected), but for many projects it provides very useful feedback of the speed, and relative position, of the motor. It is accessed via the thinner Red, Black, Blue and Yellow wires. Positive power for the encoder (<10mA) should be provided to the Red lead (+5V VCC), and Black should be connected to ground/GND. Ensure that the correct polarity connection is made to these wires.
It has a dual-channel output (channel A Blue lead, Channel B Yellow lead), with 6 complete pulses per channel, per rotation of the motor itself (12 PPR across both channels); or 60 x 6 = 360 pulses, per channel, of the output shaft given the 60:1 gearbox ratio. One of the channels is out of phase with the other, as such it is possible to tell both the speed (from pulse frequency) and direction (by reading the pulses of one channel and comparing it to the other) of the motor. The nature of the signals that are generated is illustrated below.



Safety Considerations

Electric motors such as this model are low-voltage electromechanical components that are used in a wide variety of different applications. It is important that the safety of each installation is assessed according to its own requirements, construction, end user and environment.

When designing for an end application you should bear in mind that (*this is not an exhaustive list*):

i. The motor must not be overloaded mechanically, or run above its specified duty cycle limit. Both it and any connected hardware should be designed with an appropriate safety factor (margin above the design load) for the application.
ii. This motor is not designed for safety-critical applications and should not be used in such applications.
iii. Be aware that regularly reciprocal or oscillating loads, which induce repeated loading and unloading cycles, are liable to cause fatigue stress on the motor (particularly the bearings), and so may shorten the gearbox lifespan.
iv. Power and control hardware must be appropriately specified to handle the load current required of the motor.
v. Mechanical overrides should be factored in to a design, where appropriate, due to the self-locking nature of the motor output.
vi. Overcurrent protection must be used, ideally tuned to each system (current limiting), but at a minimum an appropriately rated fuse.
vii. The motor body can get very hot during normal use, especially at higher loads. You should ensure that appropriate protections and warnings are provided for this, according to the end application.

Please refer to drawing and CAD models for dimensions, if you have any questions contact us at support@gimsonrobotics.com.